

We claim:

1. A method of creating a transformed plant, which plant in its untransformed state expresses a baseline level of PLD enzyme, said method comprising the steps of:

5 recombinantly altering the genome of said plant in an effort to change said baseline level of expression of PLD enzyme; and
testing stomatal closure characteristics of said plant after said genome alteration to determine if said plant has altered stomatal closure characteristics and the relationship between the stomatal closure characteristics and the
10 altered level of PLD enzyme expression, as compared with said baseline level.

15 2. The method of claim 1, further comprising the step of introducing an antisense gene of PLD into said genome.

20 3. The method of claim 1, further comprising the step of introducing an insert into the plant genome, said insert comprising a promoter and PLD coding sequences.

25 4. The method of claim 2, said antisense gene having at least about 60% sequence similarity with SEQ ID No. 1.

5. The method of claim 2, said antisense gene having at least about 50% sequence identity with SEQ ID No. 1.

25 6. The method of claim 3, said promoter comprising the 35S promoter.

30 7. The method of claim 3, said PLD coding sequences having at least about 60% sequence similarity with SEQ ID No. 2.

8. The method of claim 3, said PLD coding sequences having at least about 50% sequence identity with SEQ ID No. 2.

35 9. The method of claim 1, said testing including determining said plant's transpiration rate.

10. The method of claim 1, said testing including measuring said plant's diffusion resistance.

5 11. The method of claim 1, further comprising the step of exposing said plant to abscisic acid.

10 12. The method of claim 1, said testing including subjecting said plants to drought conditions.

15 13. The method of claim 1, said testing including observing said plant's turgidity.

14. A method of growing a transformed plant in a location having unsuitable water and growth conditions for said plant's growth prior to transformation, said method comprising the steps of:

recombinantly altering the genome of said plant in an effort to change the level of PLD expressed by said plant;

20 testing water consumption levels of said plant in order to determine if said genome alteration will permit plant growth in said location; and planting the progeny of said plant in said location.

25 15. The method of claim 14, further comprising the step of introducing an antisense gene of PLD into said genome.

16. The method of claim 14, further comprising the step of introducing an insert into the plant genome, said insert comprising a promoter and PLD coding sequences.

30 17. The method of claim 15, said antisense gene having at least about 60% sequence similarity with SEQ ID No. 1.

18. The method of claim 15, said antisense gene having at least about 50% sequence identity with SEQ ID No. 1.

19. The method of claim 16, said promoter comprising the 35S promoter.

5 20. The method of claim 16, said PLD coding sequences having at least about 60% sequence similarity with SEQ ID No. 2.

10 21. The method of claim 16, said PLD coding sequences having at least about 50% sequence identity with SEQ ID No. 2.

15 22. The method of claim 14, said testing including determining said plant's transpiration rate.

20 23. The method of claim 14, said testing including measuring said plant's diffusion resistance.

25 24. The method of claim 14, further comprising the step of exposing said plant to abscisic acid.

30 25. The method of claim 14, said testing including subjecting said plants to drought conditions.

35 26. The method of claim 14, said testing including observing said plant's turgidity.

27. A method of growing a transformed plant having modified stomatal closure responses to water availability, which plant in its untransformed state exhibits a baseline stomatal closure response, said method comprising the steps of:

recombinantly altering the genome of said plant in an effort to change said baseline level of stomatal closure response; and

testing said stomatal closure responses of said transformed plant to determine if said plant has modified stomatal closure responses.

28. The method of claim 27, further comprising the step of introducing an antisense gene of PLD into said genome.

29. The method of claim 27, further comprising the step of introducing an insert into the plant genome, said insert comprising a promoter and PLD coding sequences.

5 30. The method of claim 28, said antisense gene having at least about 60% sequence similarity with SEQ ID No. 1.

10 31. The method of claim 28, said antisense gene having at least about 50% sequence identity with SEQ ID No. 1.

15 32. The method of claim 29, said promoter comprising the 35S promoter.

20 33. The method of claim 29, said PLD coding sequences having at least about 60% sequence similarity with SEQ ID No. 2.

25 34. The method of claim 29, said PLD coding sequences having at least about 50% sequence identity with SEQ ID No. 2.

30 35. The method of claim 27, said testing including determining said plant's transpiration rate.

35 36. The method of claim 27, said testing including measuring said plant's diffusion resistance.

40 37. The method of claim 27, further comprising the step of exposing said plant to abscisic acid.

45 38. The method of claim 27, said testing including subjecting said plants to drought conditions.

50 39. The method of claim 27, said testing including observing said plant's turgidity.

55 40. A method of altering water consumption by a plant comprising the step of manipulating the level of PLD enzyme expression.

41. The method of claim 40, further comprising the step of introducing an antisense gene of PLD into said genome.

5 42. The method of claim 40, further comprising the step of introducing an insert into the plant genome, said insert comprising a promoter and PLD coding sequences.

10 43. The method of claim 42, said antisense gene having at least about 60% sequence similarity with SEQ ID No. 1.

15 44. The method of claim 42, said antisense gene having at least about 50% sequence identity with SEQ ID No. 1.

20 45. The method of claim 42, said promoter comprising the 35S promoter.

25 46. The method of claim 42, said PLD coding sequences having at least about 60% sequence similarity with SEQ ID No. 2.

47. The method of claim 42, said PLD coding sequences having at least about 50% sequence identity with SEQ ID No. 2.

25 48. The method of claim 40, further comprising the step of measuring said plant's water consumption.

30 49. The method of claim 48, said measuring including determining said plant's transpiration rate.

50. The method of claim 48, said measuring including measuring said plant's diffusion resistance.

35 51. The method of claim 40, further comprising the step of exposing said plant to abscisic acid.

52. The method of claim 48, said measuring including subjecting said plants to drought conditions.

5 53. The method of claim 48, said measuring including observing said plant's turgidity.

54. A transformed plant having an altered level of PLD expression in comparison to wild type plants.

10 55. The transformed plant of claim 54, said PLD level being greater in said transformed plant than the wild type plant.

15 56. The transformed plant of claim 54, said transformed plant having an insert including a sequence coding for PLD.

57. The transformed plant of claim 56, said sequence having at least about 60% sequence similarity to SEQ ID No. 2.

20 58. The transformed plant of claim 57, said sequence having at least about 70% sequence similarity to SEQ ID No. 2.

59. The transformed plant of claim 56, said insert further including a promoter operable for controlling said sequence coding for PLD.